UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/718,157	11/20/2003	Jianhua Pan	CS23552RL	8997

20280 7590 07/11/2005		EXAMINER
MOTOROLA INC		SWERDLOW, DANIEL
600 NORTH US HIGHWAY 45		

ART UNIT	PAPER NUMBER
2646	

ROOM AS437
LIBERTYVILLE, IL 60048-5343

DATE MAILED: 07/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _20 November 2003_.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-20_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-3,8-12 and 17-20_ is/are rejected.

7)☒ Claim(s) _4-7 and 13-16_ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _01 November 2004_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _11/20/03_.

4)☐ Interview Summary (PTO-413).
Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2.   **Claims 1 through 3, 8, 9, 11, 12 and 17 through 20 are rejected under 35 U.S.C.**

103(a) as being unpatentable over Bourmeyster et al. (US Patent 5,680,393) in view of

Yoshida et al. (US Patent 5,617,472).

3.   Regarding Claim 1, Bourmeyster discloses a method for suppressing background noise in

combination with echo canceling (i.e., echo and noise control) in a hands-free mobile telephone

(i.e., a communication device) (column 1, lines 8-12) comprising: receiving a voice signal at a

microphone (i.e., an input to the communication device) (Fig. 3, reference 2, s(t); column 7, lines

3-6); and performing noise suppression (Fig. 3, reference 14; column 7, lines 8-10) and echo

cancellation (Fig. 3, reference 30, 31; column 7, lines 2-3). Therefore, Bourmeyster anticipates

all elements of Claim 1 except determining order of noise suppression and echo canceling based

on background noise in the signal. Yoshida discloses noise suppression based on background

noise level determination (Fig. 5, steps S503-S508; column 2, lines 8-11). Yoshida further

discloses that such an arrangement improves articulation and conserves battery power (column 6,

lines 50-61). It would have been obvious to one skilled in the art at the time of the invention to

apply noise suppression based on background noise level determination as taught by Yoshida to

the method taught by Bourmeyster for the purpose of realizing the aforesaid advantages.

Because the combination adaptively switches between echo cancellation only (in a low noise condition) and echo cancellation with noise suppression (in higher noise condition), the order of noise suppression and echo cancellation is determined based the background noise in the signal.

4.   Regarding Claim 2, Yoshida further discloses comparing the noise level with a threshold and performing noise suppression when the background noise exceeds the threshold. Because the embodiment in Bourmeyster (i.e., Fig. 3) teaches noise suppression before echo cancellation, the combination performs noise suppression prior to echo cancellation when the noise level is above the threshold. Further, because the combination performs echo cancellation by itself when the noise level is below the threshold and noise suppression when the noise level is above the threshold, the combination performs echo cancellation prior to noise suppression when the noise level is below the threshold.

5.   Regarding Claim 3, Yoshida further discloses determining noise level when a recurrence detector determines the microphone input is a noise signal (i.e., when no desired input is received) (column 3, lines 45-50).

6.   Regarding Claim 8, Yoshida further discloses a noise level determination signal (Fig. 3, reference D2; column 3, lines 62-67) that corresponds to the indicator claimed.

7.   Regarding Claim 9, Bourmeyster discloses a hands-free mobile telephone (i.e., an electronic device) (column 1, lines 8-12) comprising: a microphone (Fig. 3, reference 2, s(t); column 7, lines 3-6) that corresponds to the audio input claimed; a loudspeaker (Fig. 3, reference 4, r(t); column 7, lines 6-7); an inherent transceiver; a noise suppressor (Fig. 3, reference 14; column 7, lines 8-10) and an echo canceller (Fig. 3, reference 30, 31; column 7, lines 2-3) that correspond to the adaptive echo and noise control system claimed and inherently sends the

desired signal to the transceiver. Therefore, Bourmeyster anticipates all elements of Claim 1 except determining order of noise suppression and echo canceling based on noise in the received signal. Yoshida discloses noise suppression based on background noise level determination (Fig. 5, steps S503-S508; column 2, lines 8-11). Yoshida further discloses that such an arrangement improves articulation and conserves battery power (column 6, lines 50-61). It would have been obvious to one skilled in the art at the time of the invention to apply noise suppression based on background noise level determination as taught by Yoshida to the method taught by Bourmeyster for the purpose of realizing the aforesaid advantages.

8.   Regarding Claim 11, Bourmeyster further discloses the noise suppressor comprising: an energy component device (Fig. 1, reference 10; column 5, lines 34-38) that corresponds to the frequency domain converter claimed and extracts energy components for frequency bands; an SNR estimator (Fig. 1, reference 11; column 5, lines 50-59) that corresponds to the noise estimator claimed and estimates a signal to noise ratio; a gain calculator (Fig. 1, reference 12; column 6, lines 26-33) that corresponds to the adaptive noise suppression controller claimed and calculates gains for noise suppression components; a synthesis circuit (Fig. 1, reference 13; column 6, lines 35-40) that corresponds to the time domain converter claimed and performs an inverse Fourier transform; and time domain filter (Fig. 1, reference 14; column 6, lines 41-50) that corresponds to the multi-channel noise suppression claimed and produces the noise suppressed voice signal.

9.   Regarding Claim 12, Yoshida further discloses comparing the noise level with a threshold and performing noise suppression when the background noise exceeds the threshold. Because the embodiment in Bourmeyster (i.e., Fig. 3) teaches noise suppression before echo

cancellation, the combination performs noise suppression prior to echo cancellation when the
noise level is above the threshold. Further, because the combination performs echo cancellation
by itself when the noise level is below the threshold and noise suppression when the noise level
is above the threshold, the combination performs echo cancellation prior to noise suppression
when the noise level is below the threshold.

10.   Regarding Claim 17, Yoshida further discloses a noise level determination signal (Fig. 3,
reference D2; column 3, lines 62-67) that corresponds to the indicator claimed.

11.   Regarding Claim 18, Yoshida further discloses determining noise level when a recurrence
detector determines the microphone input is a noise signal (i.e., when no desired input is
received) (column 3, lines 45-50).

12.   Regarding Claim 19, Bourmeyster discloses a method for suppressing background noise
in combination with echo canceling in a hands-free mobile telephone (i.e., a communication
device) (column 1, lines 8-12) comprising: receiving a signal at a microphone (i.e., an acoustic
signal at an input to the communication device) (Fig. 3, reference 2, s(t); column 7, lines 3-6)
including a noisy voice signal (i.e., a speech component and a noise component) and an echo
signal (i.e., an echo component) (column 7, lines 3-6); performing noise suppression (Fig. 3,
reference 14; column 7, lines 8-10) and echo cancellation (Fig. 3, reference 30, 31; column 7,
lines 2-3); and producing and transmitting a difference signal that corresponds to the desired
signal claimed (column 7, lines 36-39). Therefore, Bourmeyster anticipates all elements of Claim
19 except obtaining the noise component and determining order of noise suppression and echo
canceling based on background noise in the signal. Yoshida discloses noise suppression based
on background noise level determination (Fig. 5, steps S503-S508; column 2, lines 8-11) and

subtraction of a noise component (column 4, lines 5-59), which inherently includes obtaining the noise component. Yoshida further discloses that such an arrangement improves articulation and conserves battery power (column 6, lines 50-61). It would have been obvious to one skilled in the art at the time of the invention to apply noise suppression based on background noise level determination as taught by Yoshida to the method taught by Bourmeyster for the purpose of realizing the aforesaid advantages. Because the combination adaptively switches between echo cancellation only (in a low noise condition) and echo cancellation with noise suppression (in higher noise condition), the order of noise suppression and echo cancellation is determined based the background noise in the signal. Yoshida further discloses comparing the noise level with a threshold and performing noise suppression when the background noise exceeds the threshold. Because the embodiment in Bourmeyster (i.e., Fig. 3) teaches noise suppression before echo cancellation, the combination performs noise suppression prior to echo cancellation when the noise level is above the threshold. Further, because the combination performs echo cancellation by itself when the noise level is below the threshold and noise suppression when the noise level is above the threshold, the combination performs echo cancellation prior to noise suppression when the noise level is below the threshold.

13.   Regarding Claim 20, Yoshida further discloses determining noise level when a recurrence detector determines the microphone input is a noise signal (i.e., when no desired input is received) (column 3, lines 45-50).

14.   **Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bourmeyster in view of Yoshida and further in view of Liu et al. (US Patent 6,108,412).**

15.   Regarding Claim 10, Bourmeyster further discloses the echo canceller comprising a

subtractor (Fig. 3, reference 30; column 7, lines 2-3) that corresponds to the cancellation point

claimed. Therefore, the combination makes obvious all elements except an adaptive filter, a

least mean squares adaptation control and a doubletalk detector. Liu discloses an echo canceller

comprising an adaptive filter, a normalized-LMS calculator and a doubletalk detector (Fig. 3,

reference 300, 320, 330, 340; column 6, lines 16-19). Liu further discloses that such an

arrangement provides convergence to minimal error condition and maximum removal of signal

corruption (column 2, lines 41-45). It would have been obvious to one skilled in the art at the

time of the invention to apply an adaptive filter, a normalized-LMS calculator and a doubletalk

detector as taught by Liu to the method combination made obvious by Bourmeyster and Yoshida

for the purpose of realizing the aforesaid advantages.

Allowable Subject Matter

16.   **Claims 4 through 7 and 13 through 16 are objected to as being dependent upon a
rejected base claim, but would be allowable if rewritten in independent form including all
of the limitations of the base claim and any intervening claims.**

17.   The following is a statement of reasons for the indication of allowable subject matter:

18.   Regarding Claim 4, Yoshida discloses on a single threshold to determine whether noise

suppression is performed (column 4, lines 47-59). As such, the prior art fails to disclose or fairly

suggest a second threshold. As such, Claim 4 is allowable matter.

19.   Claims 5 through 7 are allowable matter due to dependence from Claim 4.

20.   Claim 13 is essentially similar to Claim 4 and is allowable matter for the same reasons.

21.   Claims 14 through 16 are allowable matter due to dependence from Claim 13.

Conclusion

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Daniel Swerdlow whose telephone number is 571-272-7531. The

examiner can normally be reached on Monday through Friday between 7:30 AM and 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Sinh H. Tran can be reached on 571-272-7564. The fax phone number for the

organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).
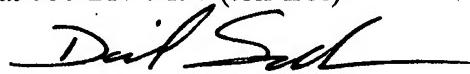
Daniel Swerdlow
Examiner
Art Unit 2646

ds
7 July 2005